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1. Introduction

One of the challenging steps in qualitative research is interpreting the data collected and presenting it in ways that enable potential beneficiaries of the research to use it readily and appropriately. In the information science discipline beneficiaries include both academics and practitioners with a diverse range of interests. With the heightened attention of governments and other funding bodies on demonstrating the broader impact of research (e.g. National Science Foundation, 2013; Research Councils UK, no date), finding appropriate, tailored ways of presenting or repackaging research results so that they can be used to make a difference increasingly important. The Cynefin framework presents one way of doing this.

This critical evaluation explores using the Cynefin framework (Snowden & Boone, 2007), which is rooted in knowledge management and complexity science, to interpret a rich and nuanced set of qualitative data collected from a three-year research project. That project engaged people worldwide to explore issues and practical strategies for accelerating the pace of positive change in managing electronic records. While electronic records management (ERM) is a rather specific information management context, Cynefin has potential as a research tool in the wider information science discipline.

For organizations, records are “information created, received and maintained as evidence and as an asset by an organization or person, in pursuance of legal obligations or in the transaction of business” (International Organization for Standardization [ISO], 2011, Clause 3.1.7) which need to be managed from creation to disposition. Electronic records, particularly those that are born digital, are more challenging to manage because they can comprise a combination of forms (e.g., text, audio, and image), can be distributed across different systems (e.g., websites and various business systems) and can be dynamic (e.g., an individual record constructed from different tables in a database).

In the mid-1990s, McDonald (1995) likened the management of electronic records in the modern unstructured office environment to the wild frontier. Wild because information technology (IT) was democratizing, decentralizing, individualizing, and personalizing the way people used and managed information and records in the workplace; and a frontier because records managers and archivists were questioning concepts and pushing at the boundaries of knowledge and theory to address the challenge of managing records in the electronic age.

Corporate rules of the road and other mechanisms have yet to be established in the electronic world. The wild frontier is unfortunately more the norm than the exception. In the modern office, it is the office worker, not the technical specialist, who works with technology applications on a daily basis. It is the office worker, not the organization, who decides what information will be created, transmitted, and stored. And it is more often than not the office worker, not the organization, who makes up the rules, if any. (McDonald, 1995, p.71)

Recognizing the challenge, researchers looked for ways to tame McDonald’s wild frontier. Seminal research includes that on identifying requirements for managing electronic records and tactics for satisfying those requirements (Bearman, 1994); on protecting the integrity of electronic records (Duranti & McNeil, 1996) and maintaining their authenticity and reliability over time (Duranti & Preston, 2008); and on requirements for recordkeeping

metadata (Evans, McKemmish, & Bhoday, 2005; McKemmish, Acland, & Reed, 1999). Notable projects include those of the National Archives of Canada (1991) and Indiana University (2002). Research has been complemented by the development of many guidelines and standards (e.g., ARMA International, 2009; DLM Forum, 2001, 2008, 2010; International Council on Archives [ICA], 2008; ISO, 2001, 2011; State Records, New South Wales, 2003, 2007; Department of Defense, 1997, 2007), and many commercial electronic document and records management (RM) systems. However, despite these significant developments, the management of electronic records continues to be a challenge for organizations, as evidenced by widely reported security breaches (e.g., unsecured health records reported to the US Department of Health & Human Services) and failures of large scale IT systems (e.g. the scrapping of the National Health Service [NHS] national IT program in the UK).

Reflecting a decade after his wild frontier article, McDonald (2005) felt that, though some progress had been made, the wild frontier had not yet been tamed. The pace of change had been relatively slow because organizations do not understand how the office of today functions, nor how it could benefit from advanced tools for managing work processes and their associated records. A key inhibitor to progress was managers' lack of understanding about records and RM; further, to make progress required a "focus on establishing a vision, enhancing awareness, assigning accountability, designing an architecture and building capacity" (McDonald, 2005, p. 8). McDonald's views influenced the authors of this article to conduct a research project (AC⁺erm¹) that explored issues and practical strategies with the aim of helping accelerate improvements in ERM. It provides the data for the study reported here.

The case of ERM appeared to be complex and the AC⁺erm project findings needed to be better understood. The Cynefin framework was then selected to achieve that. However, ERM is not untypical of the types of systems challenges that information science research explores; and the rich, nuanced data gathered is typical of that obtained in other qualitative information science projects.

2. Problem statement

Making sense of research data in a way that enables it to be more readily usable by practitioners and other stakeholders is one important pathway to ensuring the research findings can be translated into practice so that the research has impact. A wealth of qualitative data was obtained by the AC⁺erm project, covering the experiences and expertise of a wide range of participants - academics, practitioners, RM leaders. Rich and nuanced, the dataset comprises an extensive range of ERM issues and problems with associated solutions that, in the participants' experience, had worked or not worked (McLeod, Childs, & Hardiman, 2010). As the challenge of ERM affects all organizations, the potential beneficiaries of this research are many and diverse. The task was how to enable them to use the AC⁺erm results and to adopt or adapt the solutions to improve the management of their e-records. Though the data were analyzed and presented in a wide variety of forms (e.g. textual categorized themes, tables of ranked numeric data, phenomenological reflective prose, mind maps, word clouds, rich pictures, narratives, games) freely available from the project website,

¹AC⁺erm (Accelerating the pace of positive Change in Electronic Records Management) is pronounced āsirm; the + is silent, indicating only that change is positive. <http://www.northumbria.ac.uk/acerm>

anecdotal evidence in feedback and comments from users indicated they were unsure about how to apply the findings in their own contexts. The presentations were too detailed, too granular, and used research terminology. A different way of interpreting the analyzed data and presenting it in a form (or forms) that would enable the findings to be more readily used by practitioners in their own contexts was needed.

The Cynefin framework (Snowden & Boone, 2007) was selected to undertake a secondary analysis, based on the nature of the ERM challenge and the research data. Cynefin has not been widely used as a research data analysis technique or in the information science discipline. The study presented here addresses the key question:

Can the Cynefin framework be used to further analyze and interpret the research data and better understand what solution(s) might be most/least appropriate for a particular ERM issue, given the conclusion from the AC⁺erm project that tactics and solutions for ERM are contextualised, contingent and complex?

3. Literature review

The Cynefin framework was developed from research conducted over a period of years by Snowden and colleagues (Snowden, 2010). It is a framework which helps decision makers to make sense of a range of business problems and situations, in different dynamic contexts, and to take appropriate action. Because of this, it appeared to offer an appropriate approach for making sense of the AC⁺erm data and linking the issues to solutions to support appropriate action for change.

The conceptual thinking that underpins the framework draws from knowledge management and complexity science. Cynefin comprises five domains (Figure 1) representing the types of situations or environments that organizations typically experience and need to respond to and manage (Lambe, 2007, p. 134). The domains are predicated on the construct of order (Snowden, 2005, 2010). The ordered domains are labelled *simple* and *complicated*; the un-ordered ones *complex* and *chaos*; and the fifth domain, the central area, is the domain of *disorder*. It is important to appreciate that un-order is not lack of order (i.e., its opposite), but a different type of order; order that is not directed or designed, but “emergent” (Kurtz and Snowden, 2003). The characteristics of the domains are summarized in Table 1 and explained below, based on Snowden and colleagues’ many publications (in particular, Kurtz & Snowden, 2003; Snowden, 2002, 2003, 2005, 2010; Snowden & Boone, 2007).

Insert Fig. 1. Cynefin framework from Snowden (2010, Pt.7)

Insert Table 1. Summary explanation of the four Cynefin domains: simple, complicated, complex, chaos

The simple domain is characterized by clear cause and effect. The decision model is to sense the situation, *categorize* it, and respond based on best practice. The domain of efficiency, there is often a right answer; standard operating procedures and process re-engineering are appropriate practices. Mortgage payment processing would fall in the simple domain. The complicated domain is also characterized by cause and effect but there may be multiple right answers. The decision model is therefore to sense, *analyze*, and respond. This requires expertise to choose the appropriate answer (i.e., good, rather than best, practice). Possible practices are systems thinking and scenario planning. Designing a new repository for research outputs/data falls in this domain.

Unpredictability and flux characterize the complex domain. Cause and effect are only understood in retrospect; experimentation is required to find answers. The decision model is therefore to *probe* first, then sense and respond; practice emerges. The early strategic adoption of cloud computing in organizations falls into this domain in the absence of established best or good practice for implementation. As emergent practice becomes good practice this example would move to complicated and, ultimately, simple domains. Turbulence and lack of any link between cause and effect characterize the domain of chaos. In the absence of any right answers the decision model must be to *act* first and then sense and respond, (i.e., crisis management). This can lead to innovative practice; for example, the US response to the 2010 Haiti Earthquake, where social media technologies were used for the first time in a crisis as the main knowledge sharing mechanisms (Yates & Paquette, 2011).

The fifth domain, disorder, is where people are unable to decide which of the other domains represents their situation. This domain can be reduced in size through discussion to reach consensus about the nature of the situation and the most appropriate type of response, (i.e., moving to another domain or domains).

The tetrahedrons in Figure 1 are a vital part of Cynefin. They represent the connections between the center (e.g. managers) and the constituents (e.g. staff). In the ordered domains (simple and complicated) connections between a central manager and staff are strong. In the unordered domains (complex and chaos) they are weak. Differences in the connections represent different work patterns: co-ordination (simple), co-operation (complicated), collaboration (complex) and directive intervention (chaos).

No domain is more desirable than another: They just describe the situation facing the organization.

Snowden (2010, Pt.1) notes that the early versions of the Cynefin framework were based on ideas from knowledge management; for example, the Information Space (I-Space) model for understanding information flows (Boisot & Cox, 1999); the SECI model (socialisation, externalisation, combination, internalisation) where the interaction between tacit and explicit knowledge produces a spiral of knowledge creation (Nonaka & Takeuchi, 1995); and organizational learning cultures (Senge, 2006). As the Cynefin framework developed, Snowden (2010, Pt.2) brought in the aspect of decision-making, drawing on ideas from complexity science, particularly the concept of complex adaptive systems (CAS). Complexity science (Burnes, 2005; Stacey, 2011) was developed by researchers in disciplines working with natural systems and briefly comprises three key concepts: (a) chaos theory - some dynamic systems are non-linear, demonstrating complex patterns that are not directly proportional to, nor predicted from, their causes/inputs; (b) dissipative structure theory - some systems can pass through states of instability/randomness to new organized states by self-organization; and (c) CAS - a system comprising a large number of entities interacting with each other, following local principles and rules, from which emerges a self-organizing group-wide pattern not determined by the entities, the emergent patterns, or anything outside the system. The ideas of complexity theory have been used by many authors to study organizations, based on the argument that organizations are complex, non-linear, self-organizing systems. The Cynefin framework incorporates the “metaphoricians” approach (Richardson, 2008) to the application of complexity theory to organizations, using these ideas as a different lens to view sense-making and decision-making. A number of authors have criticised the way that complexity thinking has been applied to organizations (Burnes, 2005; Mingers & White, 2010; Stacey, 2011; Zhu, 2007). Stacey (2011) proposes a more innovative adaptation of the CAS idea - a complex responsive processes perspective. He recommends

that managers should use existing tools and techniques, such as the Cynefin framework, but in a reflexive way, exercising practical judgment, and accepting that they cannot fully control how these tools and techniques will work out in a specific, real-world situation (Stacey, 2012).

Cynefin can be used in different organizational contexts and for different purposes; for example, to gain new insights on a challenging problem or contentious issue, to plan actions to move a situation from one domain to another, or to consider strategies for managing different situations (Kurtz & Snowden, 2003). In management science it has been used primarily in the context of decision-making and leadership (Benson & Dresdow, 2009; Gonnering, 2010; Moerschell & Lao, 2012; Snowden & Boone, 2007). In health it has been used in a variety of contexts; for example, choosing approaches to health promotion (Van Beurden, Kia, Zask, Dietrich, & Rose, 2013), developing research in organizational behavior (Mark, 2006), analyzing chronic care (Martin et al, 2011), and understanding knowledge in clinical practice (Sturmberg & Martin, 2008).

There are only a few published uses of Cynefin in information science research. These relate to information system design and information architecture (Burford, 2011; Lambe, 2007; Snowden, 2001); types of learning supported by an Internet portal (Cronje & Burger (2006); understanding what enhances productiveness in knowledge generation in science (Van der Walt & de Wet, 2008); and evaluating library services (Hart & Schenk, 2010). None of these examples uses the Cynefin workshop technique to analyze empirical qualitative data in the way this study does.

4. Procedures

4.1. The data

The study uses data from the AC⁺erm project, a major research project (2007-10) that explored the design of an organizational-centred architecture for managing electronic records. AC⁺erm considered three facets: people, processes, and technology. The issues and problems of ERM were investigated and examples of ERM strategies, tactics, and practice were gathered, analyzed and shared. An aim was to produce practical strategies for the contemporary work environment that were scenario-based rather than organizational-based; presented issues as well as solutions; were capable of being used in practice, as well as facilitating discussion and debate; and would produce change.

Recordkeeping in the e-environment involves four stakeholder groups: executives/senior managers, records professionals, IT/systems administrators and recordkeepers (ISO 2001, 2011). It also transcends disciplines and sectors. The project therefore adopted a trans-disciplinary approach and obtained expert opinion from all four stakeholder groups.

The project's qualitative methodology comprised three phases: (a) a comprehensive systematic review of relevant literature published from 1997-2009 to identify ERM issues (Centre for Reviews and Dissemination, 2008); (b) an investigation of the three facets; and (c) a major dissemination activity running throughout its life. The investigation phase used a combination of electronic Delphi studies (gathering expert opinion on a global basis) and face-to-face colloquia (enabling in-depth discussion on a local (UK) basis). The Delphi

technique, developed in the 1950s, gathers expert² opinion on a topic through several rounds of questions, usually to reach consensus (Dalkey & Helmer, 1963). It is used for prediction, problem-solving, and policy development (Linstone & Turoff, 2002; McLeod & Childs, 2007). In this project it was used to refine and discuss the issues identified from the literature review, rank them in order of importance, propose and discuss solutions to the issues, and then evaluate the solutions.

The Delphi study participants comprised 55 different stakeholders involved in ERM, from different disciplines and within organizations working in different sectors. They responded based on their own knowledge and experience, providing real-life examples where possible. The participants' responses were analyzed using a range of different approaches to provide a broad view of the data.

A series of headline findings emerged (McLeod, Childs, & Hardiman, 2011). Many of these relate to people issues rather than processes or technology, for example:

- The people, process, and systems/technology aspects of ERM are inextricably linked.
- People issues are predominant, fundamental, and challenging.
- Tactics and solutions for ERM are contextualized and complex.
- The success and/or failure of ERM implementations can be contingent on the presence/absence of small or accidental factors.

This resulted in the conclusion that the ERM challenge is complex, contextualized, and contingent. To help practitioners choose which solutions to try in a particular circumstance required secondary analysis using a different approach, and the Cynefin framework was used to do this.

A subset of the AC⁺erm data was used. It related to the people issues and solutions and was collected from the systematic literature review and all three Delphi studies. Though each Delphi study focused on one facet of the research (people, processes, and technology), people issues and solutions were identified from all three studies, not just from the people Delphi. The Delphi data are the participants' experiences, which represent multiple organizational contexts.

The data comprise the themes from the first order analysis of the raw data. The literature themes were created using open coding (the allocation and grouping of codes), a technique based on constant comparative analysis (Strauss & Corbin, 1998). The Delphi themes were created using a robust faceted analysis of the data (Broughton, 2001) enabling the creation of structured not isolated codes, retaining sufficient context of the original. Figure 2 provides examples of both types.

Insert Fig. 2. AC⁺erm project data on issues - Examples of individual themes

The data is rich and extensive, the theming is nuanced. In total there were 446 themes: 128 from the systematic literature review and 318 from the Delphi studies. Of these, some were duplicated across the different Delphi studies and the literature. Morse (1994) identifies four cognitive processes that belong to all qualitative analysis methods, comprehending,

²There is debate about the definition of "experts" but the definition adopted here is "those who have an applicable specialty or relevant experience" (Linstone & Turoff, 2002, p. 65).

synthesizing, theorizing and recontextualizing. Synthesizing is the process of merging the data into patterns which then enables theorizing, wondering about the reasons for these patterns. It enables the data to be interpreted and provides insights. The theming of the data had enabled comprehension, however additional synthesis was needed to enable more effective translation of the research findings into practice.

4.2. Rationale for using the Cynefin framework

Problem structuring methods (PSMs) are used in complex, problematic situations (Mingers & White, 2010, p.1151). They are interactive, participatory modelling approaches to help groups reach a common understanding and consensus about the problem confronting them and how to tackle it. Soft systems methodology (SSM) is an example of a PSM and extensive literature exists on its use. However, SSM was not suitable for the secondary data analysis required here. The rationale for adopting the Cynefin framework relates to the nature of the ERM challenge and of the AC⁺erm data; the inspiration for using it came from a PhD student at Northumbria University who used it in the context of a co-operative action research project (Childs, McLeod, & Hardiman, 2009).

Cynefin has many of the characteristics of a PSM and resonates with the problem the AC⁺erm project set out to explore. Also, Cynefin has roots in knowledge management (which is closely related to RM and information management), has been developed to address critical business issues (which ERM and digital information management are), and aims “to support decision making in varied, dynamic contexts” (which is the case for ERM) (Kurtz and Snowden, 2003, p. 462). The headline findings from the AC⁺erm project (McLeod, Childs, & Hardiman, 2011) highlighted the complexity of the situation, the focus on people issues, and the huge number and range of issues and solutions identified. As well as making-sense of the AC⁺erm data, the hope was that Cynefin could provide guidance to practitioners in their decision-making in a dynamic and uncertain situation, to help them develop a strategic approach to ERM, and to guide them to select from the project’s “toolbox” of practical solutions ones that would be worth trying in their specific context.

4.3. Method

Snowden (2010, Pt.5) has developed a range of techniques for deploying the Cynefin framework, including the “four points” method. A social construction approach, it comprises:

- a *pre-process* in which items are collected about the particular issue or topic of interest or concern (these form the data, or narratives, for sense-making and can be events, points of view, anecdotes, etc.; Kurtz & Snowden, 2003);
- a *workshop* in which a representative group of people place the items in the Cynefin framework (without prior explanation of it) and both the definitions of the domains and the boundaries between them emerge from the data; and
- a *post-process* in which the resultant contextualised Cynefin framework of the issue of interest is used (e.g., within a training program, for planning, or for more detailed discussion).

A variant of this method was used with the AC⁺erm data (these variations are justified below):

- In pre-process, the existing themed data relating to people issues were used as the narratives.
- In workshop, the people taking part (the authors of this article) were two of the researchers from the original AC⁺erm project. Before the workshop they discussed and agreed their understanding of the four points method and the four domains; there was no facilitator. The four domains were labelled (with descriptive notes) and placed at the four corners of a table. First, the authors each took a portion of the themes and independently, in silence, placed them either in one of the four domains; on a boundary between domains; or in the central, fifth domain - disorder. Second, the authors reviewed, by discussion, the themes in each location to reach consensus on their allocation and some themes were reallocated. Over 90% of the themes were allocated easily, but a small number were challenging. The themes were not modified nor were new ones created, as is possible with narratives in the four points method. During this discussion, themes in each location were grouped by subject, or meta-theme. Each meta-theme was labelled, and a scope note added where necessary. This was equivalent to the step “define domains and boundaries in language that is understood within the organization” (Snowden, 2010, Pt.5). Third, the allocation of themes was finalized by taking a holistic view and reviewing each domain, and border, in turn (simple > complicated > complex > chaos).
- Post-process comprised the publication of the results in the form of the resultant framework, as an example for peer review, comment, adoption, and adaptation to address the people issues of ERM. This dissemination represents a preliminary step in the exploitation > exploration > exploitation stages referred to by Snowden (2010, Pt.5). The ERM framework can be used by others in teaching, research, and practice. It has the potential to become part of the discourse for addressing ERM situations. If practitioners find that the ERM framework is not suitable in their own context then they can use the four points method themselves with their own narratives.

To evaluate the use of Cynefin, the authors reflected individually, and together, on the process (e.g., what changes had to be made to the four points method and why; how easy was this method to use; could it be easily understood/used by RM practitioners; was it useful as a data analysis tool; could it have wider research uses) and its usefulness (e.g., what new insights were obtained; were original findings confirmed or altered; did it provide an effective way of linking the solutions to the data in a way that RM practitioners could use).

5. Findings

Figure 3 and Tables 2 and 3 summarize the results of mapping the themed people issues into the Cynefin framework. Figure 3 shows the number of themes placed in each domain and on the boundaries, highlighting that the majority (58%) are simple or complicated (the ordered domains). Almost a third of the issues are complex (32%), a similar proportion to the simple issues. Few themes fall in the chaotic domain (2%) or on the boundaries (7%). Ultimately, none remain on the simple/complicated or the simple/chaos boundaries; the majority are placed firmly into one domain or another. There is a wide variety of individual themes in any one domain, highlighted in the examples provided in Table 2. Some of the 25 meta-themes that emerged from grouping the themed issues during the mapping are illustrated in Table 3, together with their nuanced scope. Table 3 also includes potential solutions to these issues, drawn from those provided by the Delphi participants, and represents the populated Cynefin framework for the ERM people issues and solutions.

Insert Figure 3: Summary results of mapping the people issues data in the Cynefin framework domains

Insert Table 2.Examples of the range of issues in each domain

Insert Table 3. The populated Cynefin framework for the ERM people issues and solutions

6. Discussion

6.1. New insights

Given the AC⁺erm project conclusion that the ERM challenge is complex, contextualized, and contingent, the most surprising finding is that the majority (58%) of the people issues fall within the simple and complicated domains. Although the simple domain should not be confused with easy or quick solutions, it is the domain where there is a right answer; the complicated domain offers potentially multiple right answers, selected based on expert knowledge. Best practice and good practice are, respectively, the appropriate responses and, for ERM, these exist in abundance, as highlighted in the introduction. Perhaps the sheer number of simple and complicated issues makes ERM appear complex—a case of drowning in the size of the challenge.

However, complexity is not only due to the volume of simple and complicated issues; a large proportion of issues (32%) are complex. Using Cynefin reveals the truly complex issues, such as the attitudes and perceptions of the different stakeholders (Table 3). As Lambe (2007) noted, “in Cynefin terms, pretty much anything to do with human affairs resides in the Complex domain” (p. 143). People issues are challenging because they concern culture, worldviews, and preferences and behavior related to use of RM/ERM systems. From their use of the Cynefin framework, the authors have re-perceived the ERM challenge as a wicked problem (McLeod & Childs, 2013). A wicked problem (Rittel & Webber, 1973) has many causes and many solutions, with different definitions of what these are from the different stakeholders involved. Causes and solutions are inextricably linked: Deciding on a solution then determines the cause of the problem. There is no right answer, and standard problem-solving approaches are not effective.

Cynefin identifies what approaches are appropriate for the domains. For example, responses to the simple issue of lack of awareness of RM/ERM and what it comprises include building RM into the induction program for new employees and holding awareness-raising sessions, events, or activities for existing employees (best practice). An appropriate response to the complicated issue of ERM systems design is to “match them to work processes” (good practice). However, is training, which is a good or best practice approach and suitable for simple or complicated issues, appropriate for the complex issue of attitudes and perceptions of managers and staff? In the context of chief executive officers’ (CEO) lack of awareness of RM/ERM and lack of recognition of its value, some participants said yes, others said no. Some participants said CEO training should be long-term and subtle, which seems to be about influencing and marketing, not training, per se. Marketing individual benefits and managing expectations of ERM systems are suitable probes to attempt to achieve the

emergence of recognition of the value of RM/ERM and better recordkeeping behaviors. Therefore, marketing is an appropriate solution to this complex issue.

In linking issues to solutions, a many-to-many (not a 1-to-1 relationship) is highlighted between them (i.e., for each issue there are many solutions and each solution can resolve many issues). Cynefin prompts reflection on whether or not the solutions suggested by the Delphi participants are actually appropriate: As well as giving solutions that in their experience had worked, they were asked to give solutions that had not worked and therefore should be avoided. Therefore, further analysis of the “solutions to avoid” is required to discover if they should be avoided because they are innately inappropriate, given the nature (domain) of the issue, or due to the contingency of success, since solutions that work in one organization do not necessarily work in another.

In discussing seemingly similar themes that initially were placed in more than one domain, particularly in both the simple and complex domains, it became apparent that the nature of the themes was different. For example, lack of awareness of RM/ERM falls into the simple domain, whereas lack of recognition of the value of RM/ERM falls into the complex domain. In the previous analysis these two had been grouped together, the nuances hidden. Cynefin reveals the nuances and helps to decouple conflated issues.

Cynefin also provides new consideration of the importance and nature of the management pattern and connections between stakeholders required to address the ERM challenge. Centrally controlled management of records through established best practice procedures and good practice systems thinking has operated successfully in the paper world, and could be successful for the simple/complicated aspects of ERM. However, it is unlikely to be adequate for addressing the many complex issues of ERM.

6.2. Benefits of the new understanding

A key benefit of understanding the nature of the issues, from their Cynefin domain location, is that it enables the appropriate decision-making model, action(s) and management approach to be identified and used, as Van Beurden, et al.(2013) suggest. For the AC^{term} data this has lead to a conceptual and strategic mapping of the many issues and a clearer more coherent approach to identifying the appropriate solutions for practitioners to use. The resultant ERM framework (Table 3) provides the ability to focus on individual issues as well as a holistic way of interpreting the data based on the nature of the issues.

This evidence-based framework example can be directly exploited in practice, teaching, and research. It has the potential to become part of the discourse for addressing ERM situations. Additionally, if practitioners find that it does not fit their organizational context, they can use Cynefin to explore their own ERM “narratives”.

In the digital environment, where “the autonomy of individual reigns supreme!” (McDonald, 1995, p. 70), adopting the appropriate management approach is vital for successfully implementing a solution. Cynefin identifies these (coordination, cooperation, collaboration, and directive intervention) along with the connections required between managers and other staff. Coordination and cooperation can continue to be used to manage ERM issues that fall into the simple and complicated domains; however, they are unsuitable for addressing the many complex issues. Here, records managers must build strong connections with staff and other expert stakeholders and collaborate, rather than coordinate or seek cooperation.

An important element of the Cynefin framework is the concept of dynamics. It highlights that issues might be located in different domains in the future. For example, what is good practice today might become best practice in the future; what today is emergent practice might become good practice (as in, for example, cloud computing implementation). Although this was not considered in great detail in using Cynefin to synthesize the data, it raises important questions for further research.

6.3. Reflection on the use of Cynefin

In previous studies, such as Burford (2011), Lambe (2007) and Van Beurden, et al. (2013), researchers have used Cynefin in various ways (e.g., to structure findings and discussion; to draw conclusions; and, to some extent, as an explanatory theory), but in this article Cynefin is used in a new way: as a research tool.

In adopting Cynefin as a research tool, modifications were made that appear legitimate for this purpose. A key modification was that the workshop was not focused on narratives from a single organizational context but on themed data from many real experiences and organizational contexts. In the standard pre-process stage, workshop participants are asked to generate “several hundred examples of exemplar narratives of key moments in the organization’s own history, alternative histories and imagined futures” (Snowden, 2010, Pt.5). The AC⁺erm themes developed from the faceted analysis of Delphi responses are based on the Delphi participants’ real-life experiences and examples. As the faceted analysis retains the context and some of the original language of these respondents, it is justified to consider them as being similar to those used in the standard Cynefin pre-process. Although this is not true for the themes produced from the systematic literature review, these were all agreed and/or amended by the participants at the beginning of each of the Delphi studies. These themes were not modified (nor were new ones created) during the workshop process, as is possible with narratives in the four points method; the authors remained true to the data collected and analyzed from the literature and individuals, though their meanings were sometimes debated. However, not adding to the collection of narratives is not a significant modification.

Another modification was the result of not having a facilitator for the workshop. The authors therefore used their existing knowledge of the nature of the domains to replace the knowledge that the facilitator would have provided during a workshop;(e.g. initially agreeing the understanding of domains and reviewing each one to agree the categorization of individual themes).A further modification was the language used, which is supposed to be that understood by the organizational participants in the Cynefin workshop. The nature of the language used here was based in the literature and on that of the Delphi participants from their multiple organizational contexts, and from their experiences and perspectives as one (or more) of the four RM stakeholder groups. The authors themselves fall into the records professionals and record-keepers groups.

In the role of a data analysis tool, Cynefin is not suitable for use by a single researcher, as sense-making is considered to be a social process (Kurtz and Snowden, 2003). However, it can be used successfully with as few as two researchers, as demonstrated here.

6.4. The potential of Cynefin in information science research

While Cynefin can be used as a categorization tool, its real value lies in its use as a sense-making tool, as this exploratory study demonstrates. The use of Cynefin as a data analysis tool goes beyond previous uses in information science, such as in the description of differences between complex and complicated systems and their implications for intranet design (Snowden, 2001); taxonomy development in organizational contexts (Lambe, 2007); and the examination of web information architecture (Burford, 2011). Lambe (2007) used Cynefin to explore his own experience and knowledge to “get a better understanding of the benefits and limitations of different taxonomy development approaches in different contexts” (p. 133). Based on her research in large organizations, Burford (2011) located web information architecture practice in the complex domain and found CAS to be a useful explanatory metaphor for this practice, enabling it “to be seen as emergent and self-organizing and distinguishes this instance of information organization from those that are more ordered and finite in their nature” (p. 2036).

Cynefin also has potential as a data collection and analysis tool. The use of its associated narrative technique to gather data to evaluate a library service appears to be the closest published example (Hart & Schenk, 2010). The four points workshop method could have been used for the AC⁺erm project. The process would have collected data about ERM issues and facilitated discussion to help participants understand the degree of complexity inherent in the issues and the diversity of viewpoints, leading to ways of working together to find solutions. It would have brought the different stakeholders together using an alternative approach to the Delphi method. There would have been pragmatic and logistical challenges (e.g. bringing dispersed participants together, need for a facilitator expert in the use of Cynefin). However, with respect to analysis, it should be recognised that analysis in the Cynefin context comprises categorisation of whole narratives into the five domains, not the detailed theming of standard qualitative data analysis.

Cynefin is not a generic tool appropriate for all research projects. It is appropriate for projects studying big, challenging organizational problems with rich, qualitative data that require decision-making and action-taking in practice, and involve multiple stakeholders in both the situation being studied and the research. It could be used, for example, as a technique in the problem diagnosis and action planning stages of an action research project. The niche role for Cynefin can be seen if it is compared to some standard sense-making approaches commonly used in information science.

Many approaches exist to help organizations identify solutions to problems (Mingers & White, 2010). One such approach is soft systems methodology (SSM). SSM was not used for the AC⁺erm data as the data had already been collected and was from multiple contexts. SSM is a form of action research based in a single context and is complicated and time-consuming to carry out (e.g., use of the classic seven stages; Checkland & Scholes, 1990). A key sense-making theory is Dervin’s sense-making methodology (SMM) (Dervin, 1998). SMM seeks to find out how individuals understand and make sense of the problem being studied, from their own perspective and in their own terms. It comprises methods for framing questions and collecting and analyzing data. Unlike these two methodologies, Cynefin is a technique. In contrast to SSM, it is quick to carry out and can be used by practitioners with a little training. In contrast to SMM, it focuses on organizational, not individual, sense-making, and provides a blank framework (the five domains) which is populated by discussion and consensus in specific organizational contexts.

In addition to using Cynefin as a tool, could the complexity theory that underpins it become part of information science’s theoretical base as Van Beurden, et al. (2013) suggest

for health promotion? Tredinnick's (2009) critique of the role of complexity theory as a metaphor in the discourse of the Web sounds a note of caution. Echoing the criticisms of others referred to earlier (e.g. Mingers & White, 2010; Stacey, 2011), the application of complexity theory needs further consideration and research to determine its potential to add to the body of information science theory.

7. Conclusion

Using the Cynefin framework provides a different lens through which to view the rich, qualitative data from the AC⁺erm project and to categorize, interpret, and make sense of it. It prompts new questions to be asked, leading to new insights and a deeper understanding of the project findings. As a result, it enables the findings to be presented in a more readily digestible way: in the form of the ERM framework, linking solutions to issues, which practitioners, educators, and researchers can exploit. Most significantly, Cynefin provides a new construct for re-perceiving the ERM challenge in a holistic way and offers a strategic approach to action-taking to make positive change.

This successful exploratory use of Cynefin to analyze research data in a particular field of information science suggests it could be used more widely in the discipline. Rather than using it only to structure findings or discussion and draw conclusions, Cynefin has the potential to be used as a qualitative data analysis tool and also as a collaborative qualitative data collection tool. Further research is required to assess these suggestions. Cynefin could also provide a conceptual tool for practitioners to use to explore ERM in their own contexts.

The Cynefin framework is a powerful tool, not a panacea. It provides a structured yet not overly prescriptive approach to problem diagnosis, decision-making and action taking. This article demonstrates its value for research and its potential value in bridging research and practice in the information science discipline, taking research into action and developing practice as a result.

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References

- ARMA International. (2009). *Generally Accepted Recordkeeping Principles* ®. Retrieved from <http://www.arma.org/r2/generally-accepted-br-recordkeeping-principles>
- Bearman, D. (1994). *Electronic evidence: Strategies for managing records in contemporary organisations*. Pittsburgh, PA: Archives and Museum Informatics.
- Benson, J., & Dresdow, S. (2009). Common sense and integrative thinking. *Management Decision*, 47, 508-517.

- Boisot, M., & Cox, B. (1999). The I-Space: A framework for analyzing the evolution of social computing. *Technovation*, 19, 525–536.
- Broughton, V. (2001). Faceted classification as a basis for knowledge organization in a digital environment; the Bliss Bibliographic Classification as a model for vocabulary management and the creation of multidimensional knowledge structures. *New Review of Hypermedia and Multimedia*, 7, 67-102.
- Burford, S. (2011). Complexity and the practice of web information architecture. *Journal of the American Society for Information Science and Technology*, 62, 2024-2037.
- Burnes, B. (2005). Complexity theories and organizational change. *International Journal of Management Reviews*, 7, 73-90.
- Centre for Reviews and Dissemination. (2008). *Systematic reviews. CRD's guidance for undertaking reviews in health care*. (3rd ed.). York, UK: Centre for Reviews and Dissemination, University of York.
- Checkland, P., & Scholes, J. (1990). *Soft systems methodology in action*. Chichester, UK: John Wiley & Sons.
- Childs, S. McLeod, J. & Hardiman, (2009). Accelerating positive change in electronic records management – an empirical toolkit of solutions. *United Kingdom Association for Information Systems (UKAIS) Conference, Oxford, UK, 31 March - 1 April 2009*.
- Cronje, J.C., & Burger, D. (2006). Learning from a free-access digital information kiosk in Africa: An objectivist – constructivist investigation. *Aslib Proceedings – New Information Perspectives*, 58, 218-236.
- Dalkey, N., & Helmer, O. (1963). An experimental application of the Delphi method to the use of experts. *Management Science*, 9(3), 458–467.
- Department of Defense (1997). *Design criteria standards for electronic records management software applications. DoD 5015.2-STD*. Washington, DC: Department of Defense.
- Department of Defense (2007). *Electronic records management software applications design criteria standard. DoD 5015.2-STD*. (Revised ed.). Washington, DC: Department of Defense.

- Dervin, B. (1998). Sense-making theory and practice: an overview of user interests in knowledge seeking and use. *Journal of Knowledge Management*, 2, 36-46.
- DLM Forum. (2001). *MoReq: Model requirements for the management of electronic records*. DLM Forum. Retrieved from <http://moreq.info/>
- DLM Forum. (2008). *MoReq2: Model requirements for the management of electronic records*. DLM Forum. Retrieved from <http://moreq.info/>
- DLM Forum. (2010). *MoReq2010: Modular requirements for records systems*. Retrieved from <http://moreq2010.eu/>
- Duranti, L., & MacNeil, H. (1996). The protection and integrity of electronic records: An overview of the UBC-MAS research project. *Archivaria*, 42, 46-67.
- Duranti, L., & Preston, R. (Eds.). (2008). *International Research on Permanent Authentic Records in Electronic Systems (InterPARES) 2: Experiential, interactive and dynamic records*. Rome, Italy: Associazione Nazionale Archivistica Italiana.
- Evans J., McKemmish, S., & Bhoday, K. (2005). Create once, use many times: The clever use of recordkeeping metadata for multiple archival purposes. *Archival Science*, 5, 17-42.
- Gonnering, R.S. (2010). Future demands complex leadership. *Physician Executive*, 36(2), 6-10.
- Hart, N., & Schenk, M. (2010). Evaluating information and knowledge services using narrative techniques. *Information Outlook*, 14, 46-50.
- Indiana University (2002). *Electronic Records Project, Phase II, 2000-2002*. Retrieved from <http://www.libraries.iub.edu/index.php?pageId=3313>
- International Council on Archives. (2008). *Principles and functional requirements for records in electronic office environments*. (Modules 1-3). Paris, France: International Council on Archives.
- International Organization for Standardization (2001). *ISO 15489-1: Information and documentation – records management – Part 1: General and Part 2: Guidelines*. Geneva, Switzerland: International Organization for Standardization.

- International Organization for Standardization. (2011). *ISO 30300: Information and documentation - Management systems for records - Fundamentals and vocabulary*. Geneva, Switzerland: International Organization for Standardization.
- Kurtz, C.F., & Snowden, D.J. (2003). The new dynamics of strategy: Sense-making in a complex and complicated world. *IBM Systems Journal*, 42, 462-483.
- Lambe, P. (2007). *Organising knowledge: Taxonomies, knowledge and organisational effectiveness*. Oxford, UK: Chandos.
- Linstone, H.A., & Turoff, M. (Eds.). (2002). *The Delphi method: Techniques and applications*. [A reproduction of the original 1975 text]. Newark, NJ: Information Systems Department, College of Computing Sciences, New Jersey Institute of Technology. Retrieved from <http://www.is.njit.edu/pubs/delphibook>
- Mark, A. (2006). Notes form a small island: Researching organisational behaviour in healthcare from a UK perspective. *Journal of Organizational Behavior*, 27, 851-867.
- Martin, C.M., Grady, D., Deaconking, S., McMahon, C., Zarabzadeh, A., & O'Shea, B. (2011). Complex adaptive chronic care – typologies of patient journey: A case study. *Journal of Evaluation in Clinical Practice*, 17, 520-524.
- McDonald, J. (1995). Managing records in the modern office: Taming the wild frontier. *Archivaria*, 39, 70-79.
- McDonald, J. (2005). The wild frontier ten years on. In J. McLeod & C.E. Hare (Eds.), *Managing electronic records* (pp. 1-17). London, UK: Facet Publishing.
- McKemmish S., Acland G., & Reed, B. (1999). Towards a framework for standardising recordkeeping metadata: The Australian recordkeeping metadata schema. *Records Management Journal*, 9, 177-202.
- McLeod, J., & Childs, S. (2007). Consulting records management oracles – A Delphi in practice. *Archival Science*, 7, 147-166.
- McLeod, J., & Childs, S. (2013). A strategic approach to making sense of the wicked problem of ERM. *Records Management Journal*, 23, 104-135.

- McLeod, J., Childs, S., & Hardiman, R. (2010). *AC⁺erm project: Final project report*. Newcastle upon Tyne, UK: School of Computing, Engineering and Information Science, Northumbria University. Retrieved from <http://www.northumbria.ac.uk/acerm>
- McLeod, J., Childs, S., & Hardiman, R. (2011). Accelerating positive change in electronic records management: Headline findings from a major research project. *Archives & Manuscripts*, 39, 66-94.
- Mingers, J., & White, L. (2010). A review of the recent contribution of systems thinking to operational research and management science. *European Journal of Operational Research*, 207, 147–1161.
- Moerschell, L., & Lao, T.M. (2012). Igniting the leadership spark: An exploration of decision making and punctuated change. *Emergence, Complexity and Organization*, 14, 54-68.
- Morse, J.M. (1994). Emerging from the data: The cognitive processes of analysis in qualitative inquiry. In J.M. Morse (Ed.), *Critical issues in qualitative research methods* (pp. 23-43). Thousand Oaks, CA: Sage.
- National Archives of Canada. (1991). *The IMOSA Project: Information Management and Office Systems Advancement. Phase I report*. Ottawa, Canada: National Archives of Canada.
- National Science Foundation. (2013). *Grant Proposal Guide. NSF13-1*. Chapter II.C.2.d.(i). Retrieved from http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_2.jsp#IIC2di
- National Science Foundation. (2013). *Grant Proposal Guide. NSF13-1*. Chapter III. Retrieved from http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_3.jsp
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge creating company: How Japanese companies create the dynamics of innovation*. New York, NY: Oxford University Press.
- Research Councils UK. (no date). *Excellence with impact: Maximising research impact*. Retrieved from <http://www.rcuk.ac.uk/kei/maximising/Pages/home.aspx>
- Richardson, K.E. (2008). Managing complex organizations: Complexity thinking and the science and art of management. *Emergence: Complexity & Organization*, 10, 13-26.

- Rittel, W.J., & Webber, M.M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4, 155-169.
- Senge, P.M. (2006). *The fifth discipline: The art and practice of the learning organization* (Rev. ed.). London, UK: Random House Business.
- Snowden, D. (2001). The intranet as a complex ecology. *Content Management Review*, 1, 17-20. Retrieved from http://cognitive-edge.com/uploads/articles/37_Intranet_as_complex_ecology_final_.pdf
- Snowden, D. (2002). Complex acts of knowing: Paradox and descriptive self-awareness. *Journal of Knowledge Management*, 6, 100-111.
- Snowden, D. (2003). Complex acts of knowing: Paradox and descriptive self-awareness. *Bulletin of the American Society for Information Science and Technology*, 29, 23-28.
- Snowden, D. (2005). Strategy in the context of uncertainty. *Handbook of Business Strategy*, 6, 47-54.
- Snowden, D. (2010). *The origins of Cynefin*. (Pt. 1-7). Retrieved from http://cognitive-edge.com/uploads/articles/The_Origins_of_Cynefin-Cognitive_Edge.pdf
- Snowden, D.J., & Boone, M.E. (2007, November). A leader's framework for decision making. *Harvard Business Review*, 85(11), 69-76.
- Stacey, R.D. (2011). *Strategic management and organisational dynamics. The challenge of complexity* (6th ed.). Harlow, UK: Pearson Education Ltd.
- Stacey, R. (2012). *Tools and techniques of leadership and management. Meeting the challenge of complexity*. Abingdon, UK: Routledge.
- State Records, New South Wales. (2003). *Strategies for Documenting Government Business: The DIRKS Manual*. Kingswood, Australia: State Records Authority of New South Wales.
- State Records, New South Wales. (2007). *Strategies for Documenting Government Business: The DIRKS Manual*. (2nd ed.). State Records Authority of New South Wales. Retrieved from <http://www.records.nsw.gov.au/recordkeeping/dirks-manual>

- Strauss, A.L., & Corbin, J.M. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). London, UK: Sage.
- Sturmberg, J.P., & Martin, C.M. (2008). Knowing – in medicine. *Journal of Evaluation in Clinical Practice*, 14, 767-770.
- Tredinnick, L. (2009). Complexity theory and the web. *Journal of Documentation*, 65, 797-816.
- Van Beurden, E.K., Kia, A.M., Zask, A., Dietrich, U., & Rose, L. (2013). Making sense in a complex landscape: How the Cynefin Framework from Complex Adaptive Systems Theory can inform health promotion practice. *Health Promotion International*, 28, 73-83.
- Van der Walt, M., & de Wet, G. (2008). A framework for scientific knowledge generation. *Knowledge Management Research and Practice*, 6, 141-154.
- Yates, D., & Paquette, S. (2011). Emergency knowledge management of the 2010 Haitian earthquake. *International Journal of Information Management*, 31, 6–13.
- Zhu, Z. (2007). Complexity science, systems thinking and pragmatic sensibility. *Systems Research and Behavioral Science*, 24, 445-464.

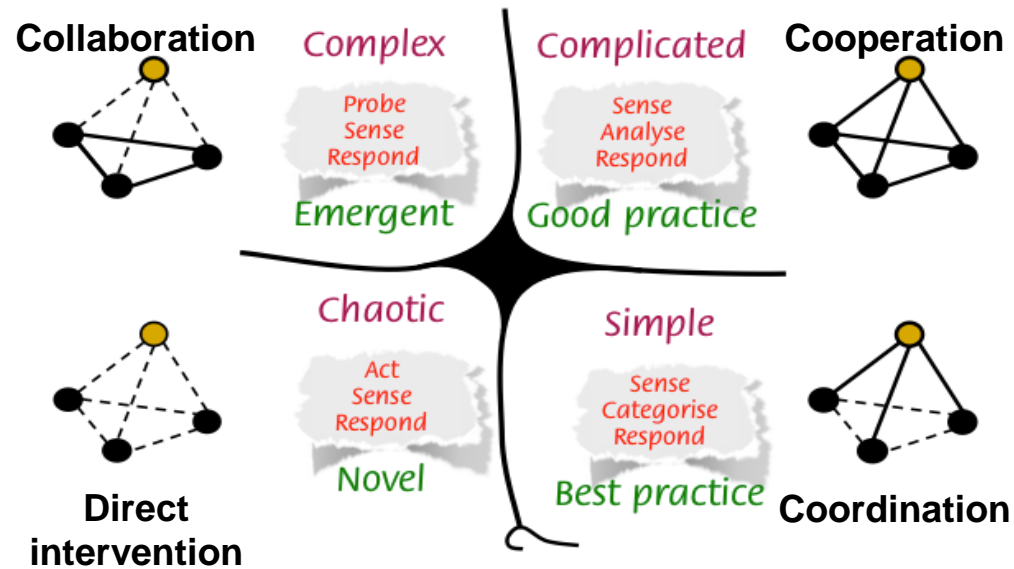


Fig. 1. Cynefin framework from Snowden (2010, Pt. 7), with additions.
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Note. In tetrahedrons, solid lines show strong connections, dotted lines show weak connections between a manager (top) and staff (base).

LITERATURE THEMES

Journal Article:

Sanders, R. L. (1999). Personal business records in an electronic environment. *Information Management Journal*, 33, 60-63.

Theme:

\$442 1999 HMM Personalization of corporate records in e-environment: end users see the records as ‘theirs’, not as a corporate resource

Key to theme code:

\$ = individual expert opinion

442 = ID number from EndNote bibliographic database

1999 = Date

HMM = **H** (Weighting of Resource = H (High) = Peer-reviewed article);

M (Weighting of Approach = M (Medium) = Expert opinion – individual);

M (Weighting of Reviewer’s Evaluation = M (Medium) = “fairly thorough; covers some issues that are often left unmentioned”)

DELPHI THEMES

Participant Responses

People Delphi, Round 1, Question

Participants were presented with a list of people issues related to ERM derived from the literature and were asked to add other issues or to refine those listed.

Response from Participant 9:

“the PC/Internet revolution has lead [sic] to people seeing information/records as theirs, not a corporate resource” I’ve seen this in a paper environment

Response from Participant 19:

“Employees are reluctant to delete information they have created because of the personal investment they have made I[in] that information”

Themes (*i.e. faceted analysis*)

information [Th] perception [Pr] resource (individual) [Pd] staff [Ag] paper environment [Sp]

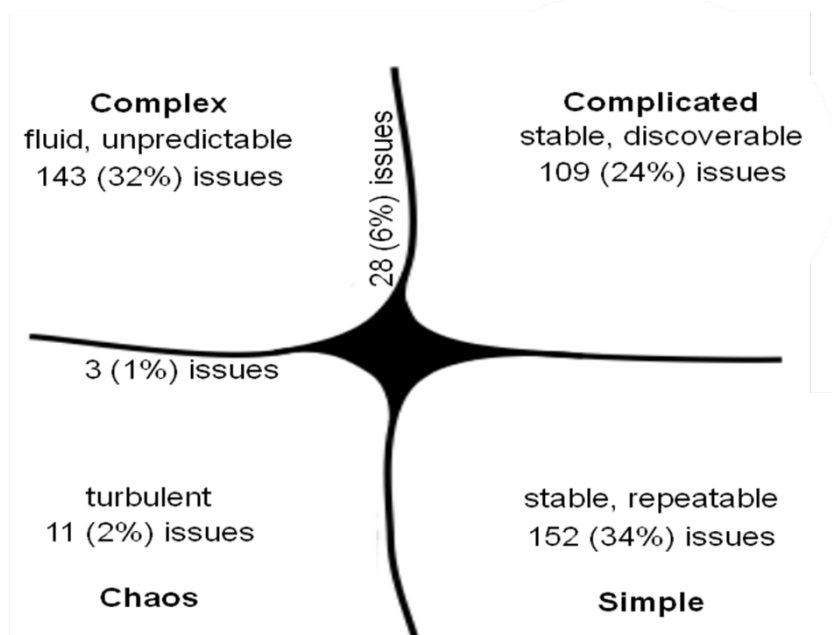
records [Th] perception [Pr] resource (individual) [Pd] staff [Ag] paper environment [Sp]

staff [Th] investment (in information, personal) [Pa] reluctance [Pr] deletion [Op] information [SOO]

Key to code:

Th = thing, Pa = part, Pr = process, Op = operation, SOO = system being operated on, Pd = product, Ag = agent, Sp = space

Fig. 2.AC⁺erm project data on issues - Examples of individual themes.



Total number of themes (people issues) = 446

Fig.3: Summary results of mapping the people issues data in the Cynefin framework domains.

Domain	Simple	Complicated	Complex	Chaos
Characteristics	Ordered, stable, repeatable	Ordered, stable, discoverable	Un-ordered, fluid, unpredictable	Un-ordered, turbulent
	Clear cause and effect evident to everyone	Cause and effect not evident to everyone	Cause and effect seen in retrospect, not in advance	No clear cause and effect
	Right answer	More than one right answer	An answer / solution may exist but don't know what this is	No right answer / solution
		Domain of experts	Domain of emergent patterns – perceived but not predicted	
	Known knowns	Known unknowns	Unknown knowns	Unknown unknowns
Decision model	Sense → Categorise → Respond	Sense → Analyse → Respond	Probe → Sense → Respond	Act → Sense → Respond
Resultant actions	Best practice	Good practice	Emergent practice	Novel practice
Techniques	Standard operating procedures Process re-engineering	Scenario planning Business intelligence Systems thinking	Complex adaptive systems thinking	Crisis management
Work pattern/ Management style	Co-ordination	Co-operation	Collaboration	Directive intervention
Connections / networks in the organization	Strong connections between the centre (managers) and the constituents (workers); weak connections between individual constituents (workers)	Strong connections between the centre (managers) and the constituents (workers); strong connections / networks between individual constituents (experts)	Weak connections between the centre (managers) and the constituents (workers); strong connections / networks between individual constituents (workers)	Weak / no connections between the centre (managers) and the constituents (workers); weak / no connections between the individual constituents (workers)

Table 1: Summary explanation of the four Cynefin domains: simple, complicated, complex, chaos

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DOMAIN	INDIVIDUAL THEMES
Simple	<ul style="list-style-type: none"> Standards and policies lack coverage of RM In the past specific staff had responsibilities for recordkeeping processes Staff engage in recordkeeping without realising it Staff lack knowledge of RM/ERM ERM systems implementation and maintenance significantly neglects training Masters degree programmes for records professionals do not provide the required ECM project skills and thorough understanding of the IT world Need to ensure the confidentiality of records, particularly of sensitive records such as health records Reasons given for lack of use of digital signatures: lack of knowledge Additional non-IT processes required to conduct business in the electronic environment: face to face / phone communication
Border between simple and complicated	None
Complicated	<ul style="list-style-type: none"> Implementation projects are not just IT projects Records professionals' RM role threatened by other professions as ERM emerges IT professionals have a project-based focus Business professionals do not fully understand what ERM is Gap between the researchers, theorists and the practitioners in ERM research Building ERM capacity in an organization IT automation of business processes doesn't work well for human intensive tasks It is easy for ERM to be circumvented Staff get frustrated with a corporate desktop experience which seems outdated compared with their experience of home computing
Border between complicated and complex	<ul style="list-style-type: none"> Recordkeeping is difficult ERM causes cultural change in organizations Organizations take the opportunity of a new IT system to change work processes, implemented through the system, so users have to change
Complex	<ul style="list-style-type: none"> ERM impacts on all staff Choices about what to record, and what records to keep and archive, are political acts Lack of recordkeeping culture causes failure of EDRMS projects in organizations Perception of the importance of RM causes good RM processes Staff are unaware of the value of information Control of e-communication conflicts with the spontaneity and

	<p>informality that make it so useful and popular in the first place</p> <ul style="list-style-type: none"> • Records professionals have an introspective focus on their own methods • Complexity of people and technical issues in RM are not understood by IT professionals or vendors • Business professionals perceive few challenges to ERM • ERM systems' implementation problems are mostly behavioral • Inconvenient access and poor usability causes staff to retain copies of information / records for their own convenience • Informal information-sharing • Staff cynicism about who is pushing the change and why, and about the need for change • New RM methods requires buy in by users • Change management needs to be included in the business case • Relationship building between records professionals and end-users
Border between complex and chaos	<ul style="list-style-type: none"> • For well-defined business processes non-records professionals usually manage the important records well, often using line of business applications. Supporting / peripheral records (often created in other types of applications) are managed less well, resulting in either neglect, or over-management / over-retention
Chaos	<ul style="list-style-type: none"> • Culture of casual creation of records and lack of discipline. Therefore respect for record integrity and care in records creation now mainly reserved for business records which are outputs of traditional processes, e.g. bank statements, policy documents, payslips

Table 2: Examples of the range of issues in each domain

	ISSUES		SOLUTIONS
Domain	Meta-theme	Scope of Meta-theme	Examples of Solutions Applicable to Meta-theme
Simple	Awareness of RM / ERM	Managers' and staff awareness (or lack of awareness) of RM / ERM and what it comprises. <i>[Contrast with attitudes / perceptions covered in the complex domain]</i>	RM awareness raising activities, e.g. at inductions
	Training in RM / ERM	Lack of training, provision of poor quality training and need for training in RM / ERM	RM training activities, e.g. by including convincing real-life examples
Border between simple & complicated	No issues identified		
Complicated	The experts	The experts involved in ERM comprise RIM professionals, IT professionals, business professionals, legal professionals. Their role, and the nature of their discipline are covered here. Personal attitudes / perceptions of experts are covered in the complex domain	Training of records professionals to encompass changing roles and new skills required Partnership working between different professional groups
	Design of RM / ERM systems	Requirements of RM /ERM systems; design of systems; what constitutes good design; problems with systems	ERM systems designed to make work processes easier for staff Provision of intuitive tools
Border between complicated & complex	Recordkeeping is difficult	The difficulty of undertaking recordkeeping, particularly in the e-environment, is because of both its complicated nature (the systems required to do it) and its complex nature (the predominance of people aspects and issues)	RM awareness raising campaigns
	Change	Covers two aspects (i) ERM causes change; (ii) Implementation of ERM / ERMS requires change. The change covers both work processes and human attitudes / behaviour	Change management

Complex	Attitudes / perceptions of managers and staff	The attitudes and perceptions of individual managers and members of staff towards RM / ERM. <i>[Contrast with awareness of RM / ERM covered in the simple domain]</i>	Marketing individual benefits of RM, targeted to staff roles and needs Managing staff expectations of RM systems, e.g. by not over-promoting what the system can deliver
	Attitudes / perceptions of experts	The experts involved in ERM comprise RM professionals, IT professionals, business professionals, legal professionals. Their personal attitudes / perceptions are covered here. Their role, and the nature of their discipline, are covered in the Complicated domain	Building a community of experts Managing relationships
Border between complex & chaotic	The different characteristics of the types of information, processes and technology	ERM in organizations is needed for both structured and unstructured information / processes, and controlled and uncontrolled technologies	Develop a strategy for using social networking tools for business purposes
Chaotic	The breakdown of records management / recordkeeping	The impact of technologies on work processes and work behaviors which has just 'happened' rather than been managed / controlled	Mandatory RM policies applied to all records media Apply penalties for lack of compliance

Table 3. The populated Cynefin framework for the ERM people issues and solutions

Note: selected examples shown